CLAIMS

We claim:

1.   A biometrics system comprising:

        an acquisition device for acquiring and storing a sequence of discrete print images

5 from a part of a hand moving during a time period;

        a trajectory process that determines the position and orientation of the images of said part of the hand as a function of time during the time period; and

        an estimator process that determines a distortion of the discrete print images as a function of time due to the change in position and orientation, wherein the estimator process

10 determines distortion by determining at least a motion of an image pattern occurring in one or more blocks of at least two of the discrete print images.

2.   A system, as in claim 1, where the part of the hand includes one or more of the following: a fingerprint and a palm-print.

3.   A system, as in claim 1, where the distortion is caused by one or more of the

15 following: rotation, translation, and shear.

4.   A system, as in claim 1, where the motion is interframe motion and where the estimator process comprises the steps of:

        determining one or more blocks of interframe motion between consecutive pairs of the images in the sequence;

20   determining a proportion of blocks with no motion to blocks with some motion;

        using the proportion to select a set of candidate distorted images;

        identifying a largest stationary and spatially contiguous block in each candidate distorted image in the set;

        estimating a global affine transformation between every pair of candidate distorted

25 images in the set about the stationary and contiguous block;

determining a curl and translation from the global affine transformation between every pair of candidate distorted images in the set; and

using the change of the curl over the time period to indicate the distortion.

5. A system, as in claim 4, where, when the change in curl over the time period is greater than a threshold, the distortion is caused by one or more of the following: rotation, translation, and shear.

6. A system, as in claim 4, where the distortion is primarily translation when curl is within a second threshold of zero and the translation exceeds a third threshold.

7. A method for detecting the distortion of a fingerprint or palm-print, comprising the steps of:

acquiring and storing a sequence of discrete print images from a part of a hand moving during a time period;

determining the position and orientation of the images of said part of the hand as a function of time during the time period; and

determining a distortion of the discrete print images as a function of time due to the change in position and orientation, wherein the step of determining a distortion further comprises the step of determining at least a motion of an image pattern occurring in one or more blocks of at least two of the discrete print images.

8. The method of claim 7, where the part of the hand includes one or more of the following: a fingerprint and a palm-print.

9. The method of claim 7, where the distortion is caused by one or more of the following: rotation, translation, and shear.

10.   A method for determining a distortion of a set of images as a function of time due to the change in position and orientation of a hand comprising the steps of:

determining one or more blocks of interframe motion between consecutive pairs of images in a sequence of images from a part of a hand moving during a time period;

5   determining a proportion of blocks with no motion to blocks with some motion;

using the proportion to select a set of candidate distorted images;

identifying a largest stationary and spatially contiguous block in each candidate distorted image in the set;

estimating a global affine transformation between every pair of candidate distorted

10   images in the set about the stationary and contiguous block;

determining a curl and translation from the global affine transformation between every pair of candidate distorted images in the set; and

using the change of the curl over the time period to indicate the distortion.

11.   The method of claim 10, where, when the change in curl over the time period is

15   greater than a threshold, the distortion is caused by one or more of the following: pure rotation, translation, and shear.

12.   The method of claim 10, where the distortion is primarily translation when curl is within a second threshold of zero and the translation exceeds a third threshold.

13.   A biometrics system comprising:

20   an acquisition device for acquiring and storing a sequence of discrete images from a part of a hand moving during a time period;

a trajectory process that determines the position and orientation of the images of said part of the hand as a function of time during the time period;

an estimator process that determines a distortion of the discrete images as a

25   function of time due to the change in position and orientation, wherein the estimator process determines distortion by determining at least a motion of an image pattern occurring in one or more blocks of at least two of the discrete print images; and

identifying a person utilizing at least said determined distortion.

14.   A biometrics system comprising:

an acquisition device for acquiring and storing a sequence of discrete images from a part of a hand moving during a time period;

5   a trajectory process that determines the position and orientation of the images of said part of the hand as a function of time during the time period;

an estimator process that determines a distortion of the discrete images as a function of time due to the change in position and orientation, wherein the estimator process determines distortion by determining at least a motion of an image pattern occurring in one or

10   more blocks of at least two of the discrete print images; and

authenticating a person utilizing at least said determined distortion.